

PROBABILITY

$(P_1 + P_2)$ (5-6 Marks)

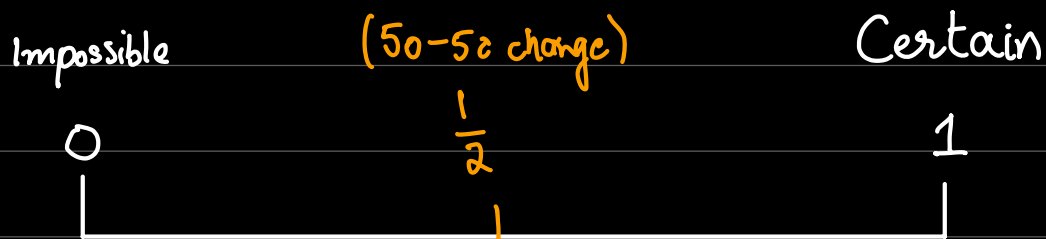
STUDY OF CHANCE

RAIN : 30 %

NOT RAIN = 70 %

$$P(\text{RAIN}) = \frac{30}{100} = \frac{3}{10}$$

$$P(\text{NOT RAIN}) = \frac{7}{10}$$



$$P(\text{event}) = \frac{\text{FAVORABLE OUTCOMES}}{\text{TOTAL OUTCOMES}}$$

1) Toss A FAIR COIN : H/T

Total = 2

$$P(\text{Head}) = \frac{1}{2}$$

$$P(\text{Tail}) = \frac{1}{2}$$

2

2) Toss Two coins:

TOTAL = 4

HH	TT	HT	TH
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$$P(\text{both tails}) = \frac{1}{4}$$

$$P(\text{a head and a tail}) = \frac{2}{4} = \frac{1}{2}$$

$$P(\text{both same}) = \frac{2}{4} = \frac{1}{2}$$

3) Roll A DICE/DIE: 1/2/3/4/5/6 Total = 6

$$P(\text{even}) = \frac{3}{6} = \frac{1}{2}$$

$$P(\text{prime}) = \frac{3}{6} = \frac{1}{2}$$

FACTORS

v/s

MULTIPLE

1, 2, 3, 4, 6

12

24, 36, 48, 60, ...

12 is BOTH FACTOR
AND MULTIPLE OF
ITSELF.

NO DECIMALS
NO FRACTIONS

NATURAL: 1, 2, 3, 4, ...

WHOLE : 0, 1, 2, 3, 4, ...

INTEGERS : Numbers without decimal & fraction.

... -3, -2, -1, 0, 1, 2, 3, ...

EVEN : Leaves no remainder when divided by 2

0, 2, 4, 6, 8, ...

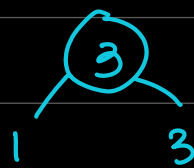
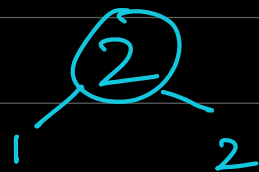


$$P(\text{even}) = \frac{3}{5}$$

ODD : 1, 3, 5, 7, ...

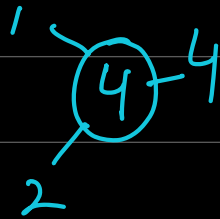
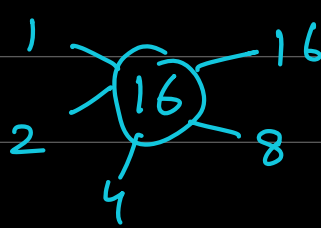
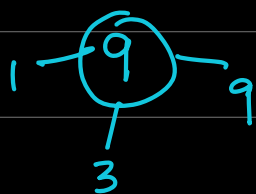
PRIME: EXACTLY TWO FACTORS

1
NOT A
PRIME



COMPOSITE : MORE THAN 2 FACTORS

1
Not composite.



4) ROLL A DICE AND TOSS A COIN: TOTAL=12

1H 1T

2H 2T

3H 3T

4H 4T

5H 5T

6H 6T

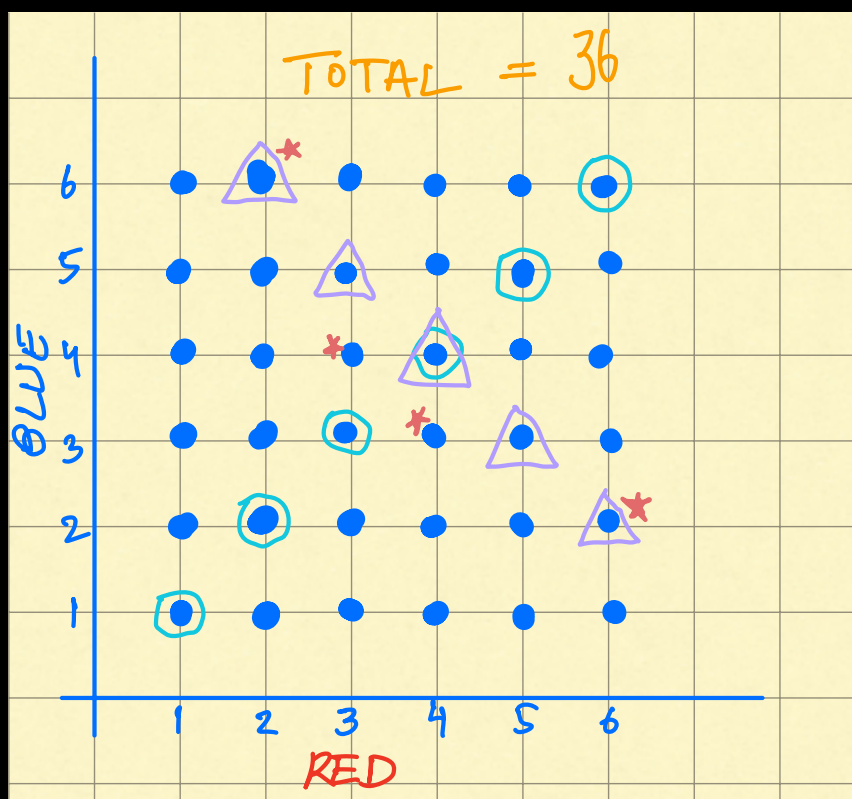
Factors of 12: 1, 2, 3, 4, 6, 12

$$P(\text{tail with even}) = \frac{3}{12} = \frac{1}{4}$$

2T, 4T, 6T

$$P(\text{head with factor of 12}) = \frac{5}{12}$$

4) ROLL TWO DICES:



$$P(\text{both Same}) = \frac{6}{36} = \frac{1}{6}$$

$$P(\text{Sum is 8}) = \frac{5}{36}$$

$$P(\text{Product is 12}) = \frac{4}{36} = \frac{1}{9}$$

11	21	31	41	51	61
12	22	32	42	52	62
13	23	33	43	53	63
14	24	34	44	54	64
15	25	35	45	55	65
16	26	36	46	56	66

TREE DIAGRAMS:

RULES:

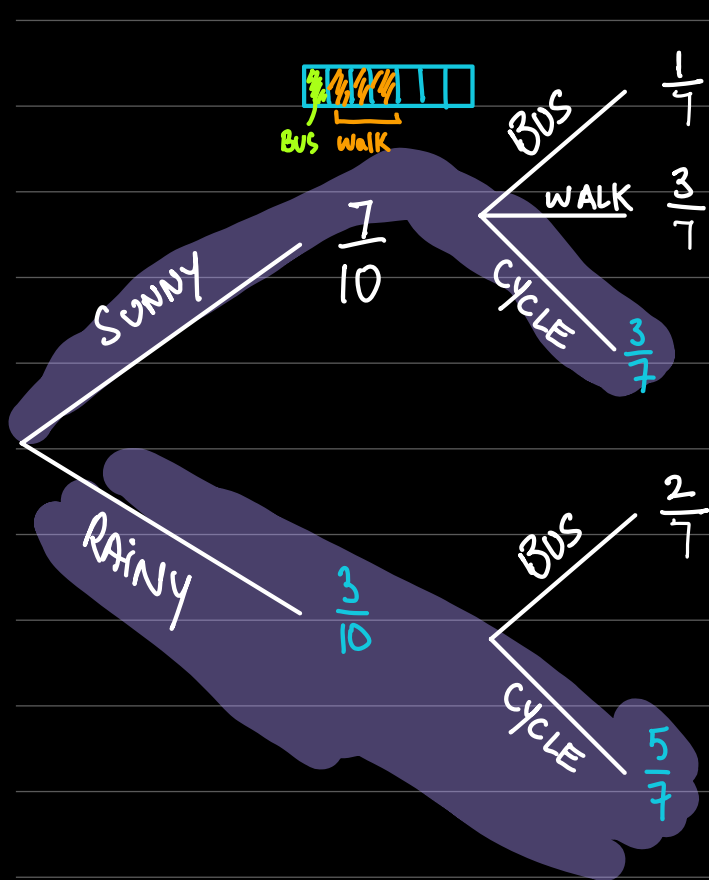
- 1) SUM OF ALL PROBABILITIES OF BRANCHES STARTING FROM SAME POINT IS ALWAYS 1.
- 2) BRANCH TOTAL PROBABILITY = MULTIPLY
- 3) MORE THAN ONE = ADD INDIVIDUAL BRANCH
BRANCH TOTALS

OPERATORS

AND mean MULTIPLY

OR means ADD

ONLY ON TREE DIAGRAMS, WE WRITE FRACTIONS WITHOUT SIMPLIFICATION

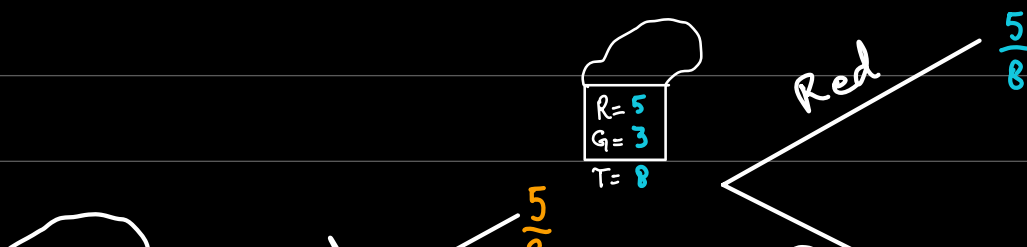


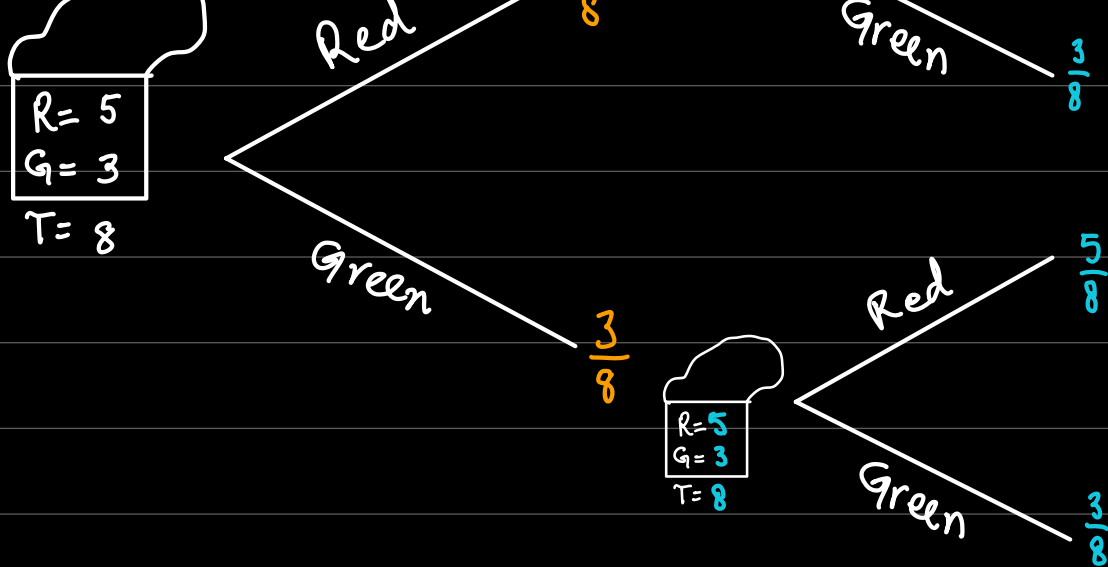
$$P(\text{sunny and bus}) = \frac{7}{10} \times \frac{1}{7} = \frac{7}{70} = \frac{1}{10}$$

$$\begin{aligned} P(\text{cycle}) &= \left(\frac{7}{10} \times \frac{3}{7} \right) + \left(\frac{3}{10} \times \frac{5}{7} \right) \\ &= \frac{21}{70} + \frac{15}{70} \\ &= \frac{36}{70} = \frac{18}{35} \end{aligned}$$

TWO DRAWS WITH REPLACEMENT

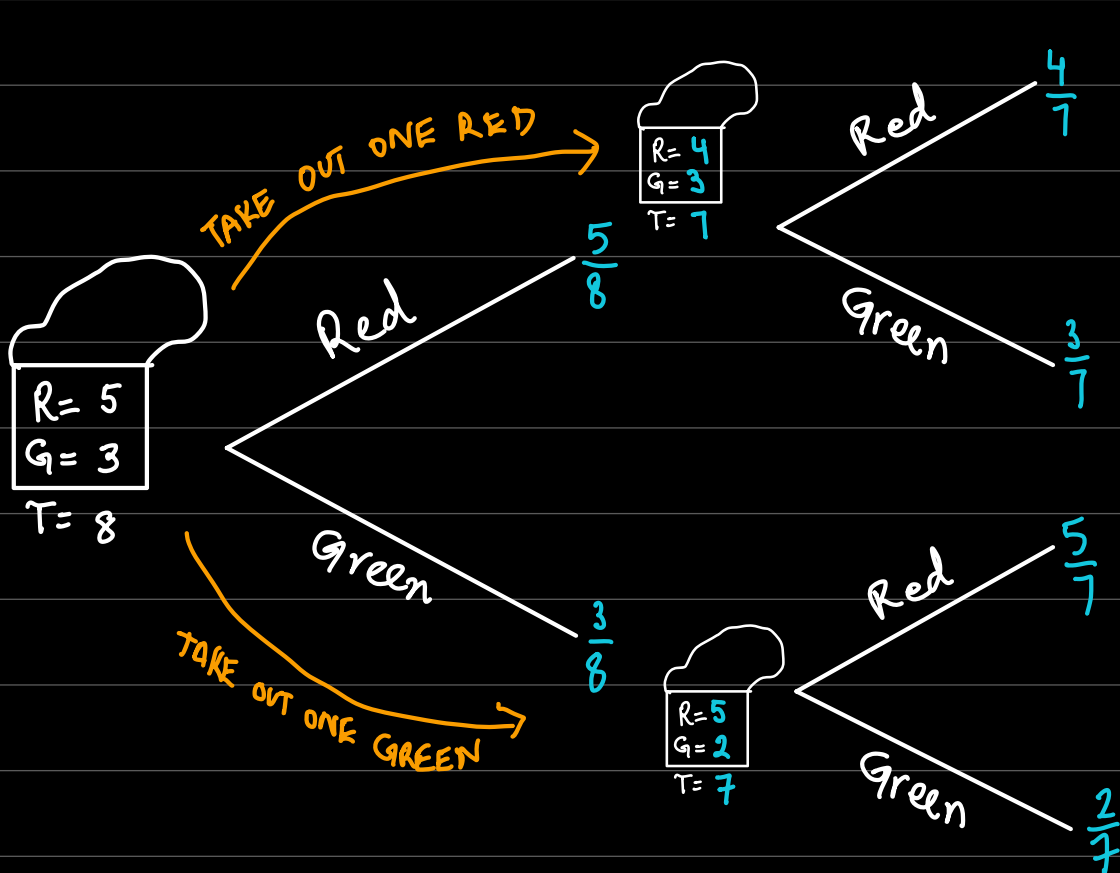
TAKE OUT ONE BALL, CHECK ITS COLOUR, PUT IT BACK IN BAG, TAKE ANOTHER BALL





TWO DRAWS WITHOUT REPLACEMENT

TAKE OUT ONE BALL, NOTE ITS COLOUR, THROW IT AWAY. NOW TAKE ANOTHER BALL OUT.

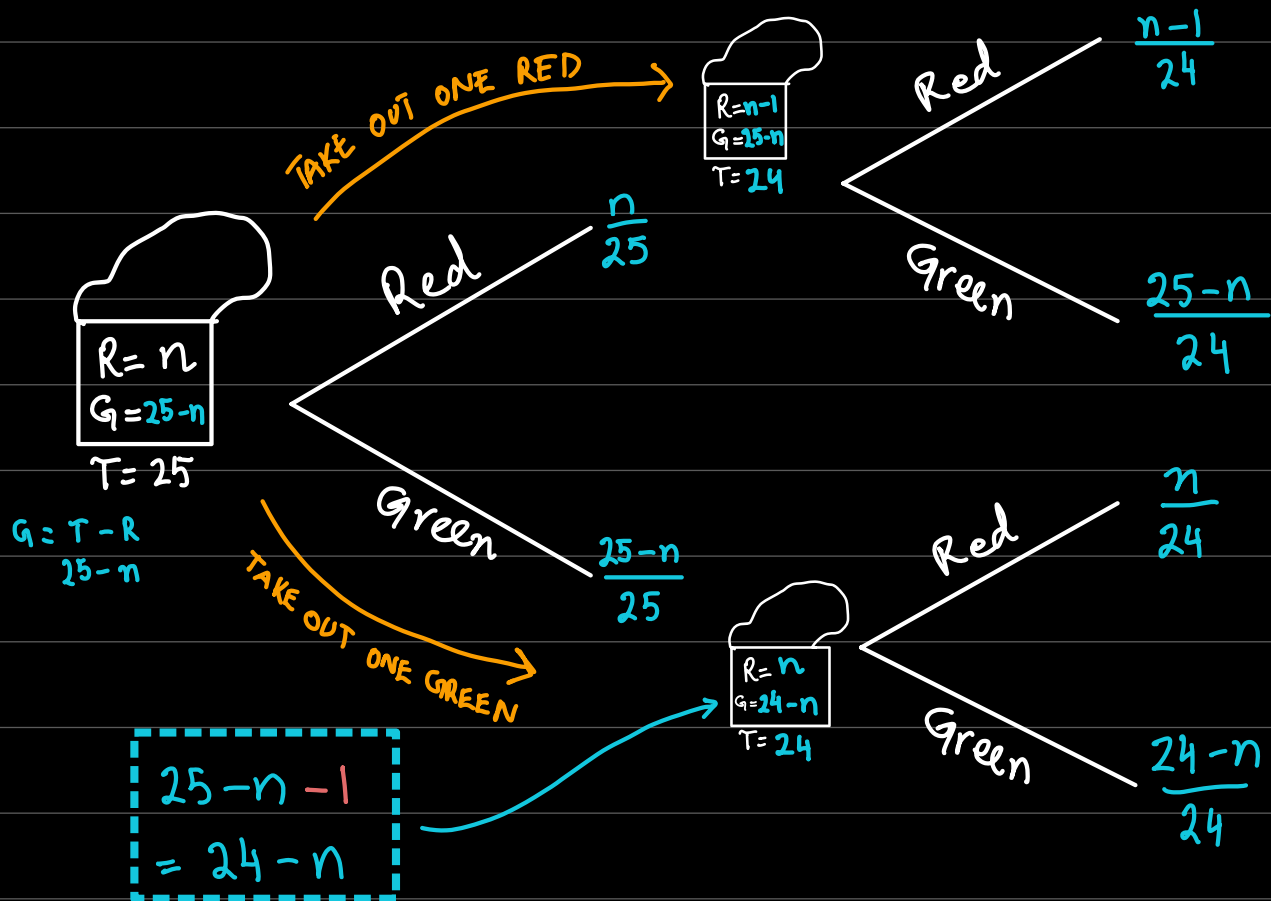


STEP 1:
Write probabilities of original bag.

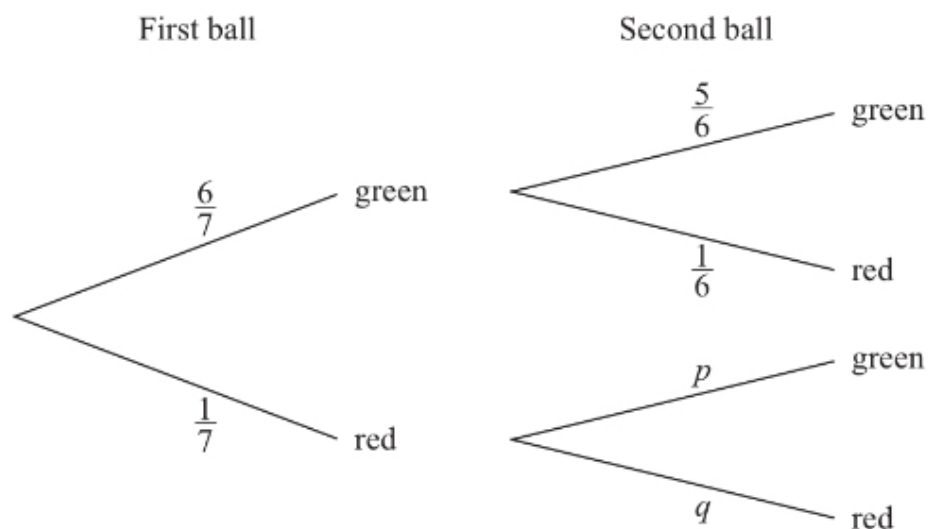
STEP 2:
DRAW a ball and make new bag.

STEP 3:
Write probability of new bag.

TWO DRAWS WITHOUT REPLACEMENT



- 7 A bag contains 7 balls, 6 of which are green and 1 is red.
Two balls are taken from the bag, at random, without replacement.
The tree diagram that represents these events is drawn below.



- (a) Find the values of p and q .

Answer (a) $p = \dots\dots\dots q = \dots\dots\dots$ [1]

- (b) Expressing each answer as a fraction in its simplest form, find the probability that

- (i) both balls are green,

Answer (b)(i) $\dots\dots\dots$ [1]

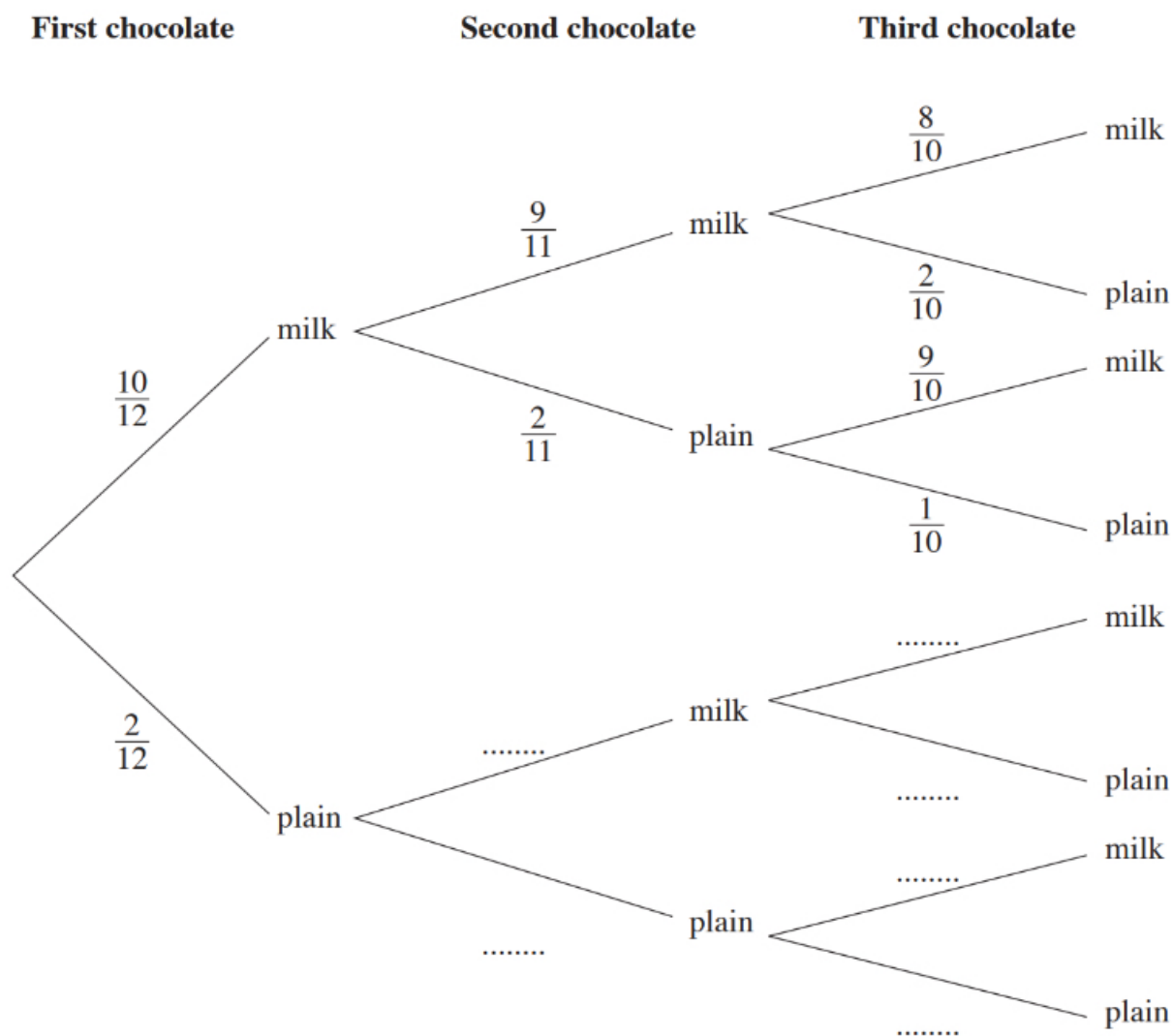
- (ii) the two balls have different colours.

Answer (b)(ii) $\dots\dots\dots$ [1]

- (a) Complete the tree diagram.



- 4 (a) A box of chocolates contains 10 milk chocolates and 2 plain chocolates. Sacha eats 3 chocolates chosen at random from the box. The tree diagram shows the possible outcomes and their probabilities.



(i) Complete the tree diagram. [2]

(ii) Expressing each answer as a fraction in its lowest terms, find the probability that Sacha

(a) eats 3 milk chocolates,

Answer [1]